Consumer Engagement with eHealth Information through Smartphones and tablets:

An Australian perspective

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Abstract*—This paper is a work in progress that examines current consumer engagement with eHealth information through Smartphones or tablets. We focus on three activity types: seeking, posting and 'other' engagement activity and compare two age groups, 25-40s and over 40-55s. Findings show that around 30% of the younger age group is engaging with Government and other Health providers' websites, receiving eHealth emails, and reading other people's comments about health related issues in online discussion groups/websites/blog. Approximately 20% engage with Government and other Health providers' social media and watch or listen to audio or video podcasts. For the older age group, their most active engagement with eHealth information is in the seeking category through Government or other health websites (approximately 15%), and less than 10% for social media sites. Their posting activity is less than 5%. Other activities show that less than 15% of the older age group engages through receiving emails and reading blogs, less than 10% watch or listen to podcasts, and their online consulting activity is less than 7%. We note that scores are low for both groups in terms of engaging with eHealth information through Twitter.

***Keywords*—eHealth, mHealth, consumer mobile search and activity behaviour**

I. INTRODUCTION

The field of Internet and mobile health related services is growing exponentially and provides an interesting and important field of investigation for researchers [1 - 3]. With the introduction of Smartphones, the opportunity to offer eHealth services to mobile devices provide additional avenues for delivering cost effective health programs that take advantage of Web 2.0 capabilities and the multi-media components of the mobile spectrum [4-7]. More recently, this aspect of mobile delivery has been enhanced by the introduction and rapid take up of tablet computing, such as the iPad™ and the Samsung Galaxy™ range. These two mobile devices provide the capacity to integrate mobile technologies, with the mobile Internet and social media services on the one portable device. In this paper we use the term eHealth as the umbrella term that includes mHealth offerings enabled for mobile devices.

While there is strong interest by developers of eHealth services, shown in the 2010 Global mHealth Developer [8], whether or not the actual consumers are aware of, and engage with these offerings is a critical factor in their success. As such, it is important to investigate consumer engagement with various types health services delivered across the digital platforms available.

This paper focuses on Australian consumers' behaviour towards eHealth services accessible through Smartphones or tablets. Their behaviour is categorised into seeking, posting and 'other' activity to gain insights into how they are engaging with the options available for mobile devices. We believe this is one of the early studies that specifically categorises consumer activity this way to investigate which activities are most prevalent. The paper is organised as follows: Section II focuses on the background to the research, Section III identifies the context, followed by Section IV, Research Design. Results are presented in Section V and Section V1 discusses the findings as well as limitations and future research

II. BACKGROUND OF CONSUMERS' USE OF INTERNET AND MOBILE HEALTH SERVICES

Consumer opportunities to access and engage in Internet and mobile-based health related information and services to encourage a healthy lifestyle are potentially extensive [2]. While it is vital that a country has appropriate technological capacity and readiness to deliver eHealth initiatives [9] examination of consumers as end-users of these initiatives is important also to determine the extent of their voluntary engagement with such services over time.

Regarding eHealth product and service offerings, it is necessary to examine the type of behaviour involved to better gauge how consumers are engaging with what is available. Using extant studies, this behaviour can be categorised into approximatetly seven types of activities: seeking, posting, receving, reading, watching, listening, and consulting. Examining consumers' behaviour within these categories

permits more insights for eHealth service providers as to which types of activities are undertaken more regularly.
For example, Nugawela and Sahama [1] identified trends in the types of health care related activities for USA Internet users between 2008 and 2010. Findings show increases of 9% (31.74% to 40.62%) in seeking information about private insurance, Medicare and Medicaid. Substantial increases are noted postings of health related information on social media such as Facebook, MySpace, LinkedIn (4.91% to 31.15% = 26% increase), Twitter (1.03% to 21.33% = 20% increase), as well as watching or listening to online video/audio about health or medical issues (11.66% to 28.96% = 17%) suggesting that Web 2.0 provides improved ways for USA consumers to engage in exchanging health related information online. Nugawela and Sahama's findings also show a drop in other forms of engagement with online health or medical information, such as signing up to receive emails, reading other people's commentaries or experiences, as well as consulting online rankings of doctors and medical facilities. An activity shown to be stagnating over the two years is that of posting online review of doctors or hospitals, with 5% or less of US users doing so by 2010.

The introduction of Smartphones and tablet computing, together with the roll out of 3G and 4G networks create further opportunities to deliver eHealth services for mobile devices [10]. These devices facilitate access to Web 2.0 technologies such as mobile Internet, mobile social media. The shift to the mobile platform potentially changes how health services can be delivered owing to high mobile phone penetration rates in both developed and developing nations [11]. This is also being driven by substantial interest in the commercial development of mHealth applications and predicted to be worth around US$23bn by 2012 [8]. It is recognised however, that end-user adoption will be the critical factor in the viability and economic efficiency of most digitised health service delivery. Thus it is timely to investigate how consumers are engaging with eHealth offerings through mobile devices.

III. An Australian Perspective

A. Research focus

The focus of this paper is on Australia with a population of approximately 23 million [12] and substantial regional, rural and remote populations that require effective delivery of health services [12-13]. Australia is technologically well developed and anticipating the ongoing rollout of the National Broadband Network over the coming years which will facilitate improved Internet access and downloads speeds, as well as the delivery of Web2.0 innovations [14)]. Moreover, the diffusion of Smartphones and tablets into the Australian population continues to grow [15] and will benefit from the improved network system.

The study was conducted in Queensland, the second largest state in Australia, covering 1.729,958 km^2 with a population of a little over 4.5 million in 2012 [16]. While much of this population is located in South East Queensland, the issues regarding facilitating health service delivery to all Queenslanders regardless of their location is a strong focus for the State Government [17].

As part of a work in progress, we report on findings from a survey undertaken in Queensland. The focus in this paper is on three of the behavioural categories noted earlier, in relation to eHealth services accessed through mobile devices: seeking, posting and a composite category we have named 'other engagement', that includes receiving, reading, watching/ listening and consulting.

IV. Research design and participants

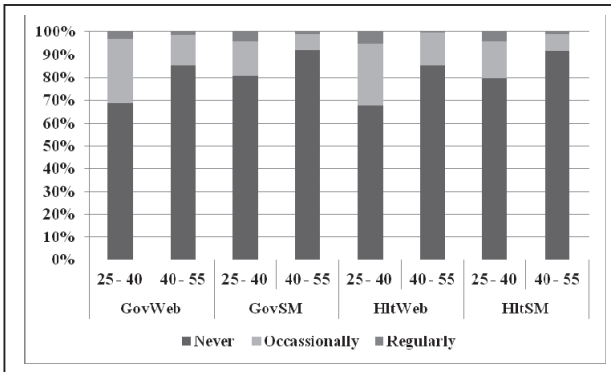
The study was conducted in December 2012, using an online survey on the use of eHealth services. This paper focuses on questions asked about different types of consumer engagement activities with health information available through the Internet and social media that are accessible through Smartphones and tablets.

The sample was purchased from an Australian Market Research Company who recruited participants from their consumer panel. The criteria for recruitment were that respondents resided in Queensland and were between the ages of 20 to 65 years. A total of 750 usable responses were received with an even gender split. Results show that 67% of the sample have a Smartphone and 31% have a tablet, which is similar to the 2012 Australian Mobile Phone Lifestyle Index (AMPLI) study of 78% and 38% [15].

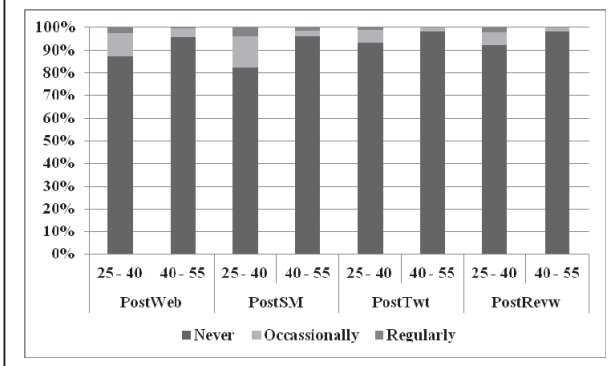
The analysis involves crosstabs for two age groups, 25 - 40 and over 40 - 55 years, as they are within the age range of two groups identified as having increased health risk factors in the 2012 Australian Institute of Health and Welfare report [18]. We take a novel approach to the analysis by focusing on three categories of activity towards engaging with eHealth information through mobile devices, an approach that is not clearly identified in current literature: 1) *seeking* relates to seeking information from Government Health Departments' website or social media sites (e.g. Facebook, YouTube or Linked In) or through other Health Provider websites or social media; 2) *Posting* relates to participants' posting health related information on websites, social media or Twitter; 3) Other Engagement relates to four activities: a) *receiving* email newsletters, updates or alerts about health or medical issues via email or twitter; b) *reading* someone else's commentary or experiences about health or medical issues through an online news group, website or blog; c) *watch/listen* to an online video or audio (podcast) about health or medical issues; and d) *consulting* online rankings/reviews of doctors or other healthcare or online rankings/reviews of hospitals or other medical facilities.

V. Results

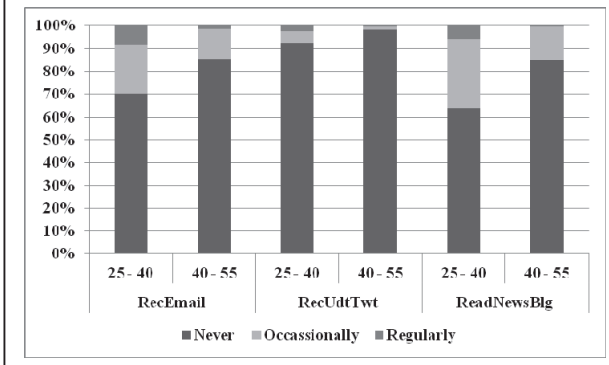
Results show that 66% of the 25-40 age group and 64% of the over 40-55 group interested in managing their health and 23% and 29% have a neutral interest. The results for the activities are shown in Fig. 1 and Table I show the questions asked with their labels corresponding with the labels at the bottom of the bar graphs.



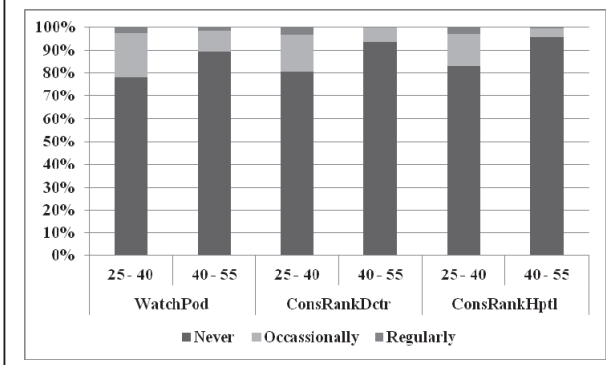
(a) Information SEEKING acitvity



(b) Information POSTING activity



(c) OTHER engagement activities



(d) OTHER engagement activities (cont)

Fig. 1. Consumer engagement activities through mobile devices (Responses measuring levels of engagement are: *never, occasionally* and *regularly*.)

TABLE I. SURVEY QUESTIONS RELATING TO ACTIVITIES

Item labels	Items from survey
	Seeking Behaviour - how often do you …
GovtWeb	Seek health related information through Government Health Departments' Internet sites?
GovSM	Seek health related information through Government health providers' social media sites, (e.g. Facebook, YouTube or Linked In)?
HltWEb	Seek health related information through other health providers' Internet sites?
HltSM	Seek health related information through other health providers' social media sites, (e.g. Facebook, YouTube or Linked In)?
	Posting Behaviour - How often do you …
PostWeb	Post health related information on an Internet site.
PostSM	Post health related information on a social networking site (e.g. Facebook, YouTube or Linked In).
PostTwt	Post health related information on Twitter.
PostRev	Post an online review of a healthcare provider or health facility?
	Other engagement activities – How often do you…
Recemail	Receive email updates, newsletters or alerts about health or medical issues
RecUdtTwt	Receive updates or alerts about health or medical issues through Twitter?
ReadNews Blg	Read someone else's commentary or experience about health or medical issues on an online news group, website or blog?
WatchPod	Watch/ listen to an online video or audio (podcast) about health or medical issues?
ConsRank Dctr	Consult online rankings or reviews of doctors or other healthcare providers (e.g. physiotherapists, naturopaths)
ConsRank Hptl	Consult online rankings or reviews of hospitals or other medical facilities

A. Seeking activity through mobile environments

Results for seeking activity in Fig. 1(a) show that the 25-40 age group is more engaged with seeking activity than those in the 40-55 age group. For example, 31% of the younger age group occasionally or regularly seek health information through Government websites and 19% through government social media environments compared to 14% and 7.5% for the older age group. Results for the younger age group's seeking activity with other Health providers' websites and social media environments are 32.5% and 20% respectively. For the older age group, they are 15% and 8%.

B. Posting activities through mobile environments

Fig. 1(b) results show that occasional and regular posting activity on health websites (13% and 4.5% respectively) and through health related social media (18% and 4%) including twitter (7% and 2%) is low for both age groups. Posting reviews is also low (8% and 2% respectively).

C. Other engagement activities through mobile environments

Fig. 1(c) and (d) relate to other consumer engagement activities through mobile devices. For the 25-40 age group results show that 30% occasionally or regularly receive email updates, newsletters or alerts about health or medical issues and 40% occasionally or regularly read someone else's

commentary or experience about health or medical issues on an online news group, website or blog. However, they only occasionally receive updates or alerts about health or medical issues through Twitter (7%). The older age group are much less engaged with these forms eHealth engagement activities as much lower percentages are reported: 15% for email, 2% Twitter, 15% read other peoples comments.

Fig. 1 (d) shows the younger age group is engaged with watching or listening to video or audio (podcast) about health or medical issues (22%), consulting online rankings or reviews of doctors or other healthcare providers such as physiotherapists, naturopaths (19.5%) as well as consulting online rankings or reviews of hospitals or other medical facilities (17%). For the older age group, 10.5% are occasionally or regularly engaged with online video or audio podcasts, but show much lower results for consulting rankings of health practitioners (6.5%), or health facilities (4%).

VI. DISCUSSION

The particular focus in this paper is on consumers use of Smartphones and/or tablet computing for access to health information. Smartphone ownership is quite high (76%) tablet computers are currently around 38%, and should increase to around 71% by mid 2013. The highest daily use of Smartphone and tablets in 2012 are clustered around: email (19% and 30% respectively), getting information (28% and 42%), for entertainment (24% and 40%), and visiting or browsing websites (26% and 42%) [15].

We also focused on two important age groups considered to have higher risk factors in terms of obesity, diet, smoking and alcohol [18]. By categorising the types of activities that constitute consumer engagement with available information from both health agencies and peer to peer sources, it is possible to get a snapshot of what is being accessed through mobile devices.

In summarising the key points of the findings it is noted that both age groups are not excessively engaged with eHealth activities through their mobile devices at this particular time. However, the younger age group does exhibit higher rates of occasional and regular activity compared to the older age group. While this may sound intuitive, older people's engagement with mobile phones has increased substantially, and there should be a flow-on effect for engaging with eHealth information and interventions [19]. We can regard certain activities as facilitating engagement, particularly through individuals being able to contribute to the social media offerings. Findings for *posting* activity, such as providing comments, opinions and reviews, show that this is less likely even for the younger age group. As an extension of this lack of active contributing, findings also show the younger age group prefers more passive engagement in the forms of receiving health emails, reading/watching podcasts or consulting other people's reviews.

Government departments and health agencies are involved in providing websites and Facebook sites to assist the public to access eHealth information. Findings show that approximately one third of the younger age group seek information on mobile devices from Government health websites, and less than 20% do so through Government social media sites. Figures are very much the same for their access to other Health providers' eHealth offerings. The older age group's figures are 15% or less across the two types of providers.

Overall our findings suggest that such activities are still very much in an early stage of diffusion owing to the high level of responses of *never* shown in the graphs. The results reported above, therefore, show important areas of activity that can be further developed over the coming years. Moreover, the findings are relevant for both the younger age group where health concerns should be emerging, and the older age group where health concerns should be important.

In terms of positioning our findings with other studies, while there is literature on the use of social media and healthcare, see Hamm et al. [20], much of this work focuses on Internet accessed engagement. There are limited studies that specifically examine health engagement activity through mobile devices. Moreover, taking such a novel approach to the study through categorising the activities has not received much attention in the literature so far.

Such findings on the daily use of both mobile devices would suggest that in terms of consumer engagement with eHealth information, it is more likely that this will happen through tablet computing rather than Smartphones. For Smartphones the activity of choice for eHealth may well be through downloading Applications (APPS) to better manage their health, as the AMPLI study shows that 23% of respondents have downloaded health and wellbeing APPs in 2012 [15]. For health informatics groups and other practitioners involved in disseminating eHealth information, our findings show encouraging indicators of consumer engagement activity through mobile devices. This of itself is important as providers need to see some return on their investment from enabling their websites and social media sites for Smartphone and tablet access. The findings also suggest that there is a need for more focused promotion of the value of accessing eHealth information through mobile devices whether this is done through the media, through health providers, such as clinics or practitioners, or other points of contact with patients or the public.

Encouraging different age groups to take more active management of their personal health is important, particularly since the introduction of the Federal Government personally controlled electronic health record (PCEHR) initiative in 2012 [21]. As the PCEHR capabilities roll-out, being able to upload all manner of eHealth information through mobile devices will improve Australian consumers' abilities to better manage their personal health in the future. The study findings also suggest that consumer awareness and promotion of the capabilities of eHealth, seen as eHealth success factors elsewhere in the world [22], would contribute to the adoption of the PCEHR en masse by the Australian consumers, which is necessary for the realisation of its benefits.

Limitations and opportunities for future research include: 1) a geographical limitation as the study only focuses on the Australian population, in particular selecting one state for the study. Whether these finding are generalisable to Australia as

a whole, or to other geographic populations, needs further research. This would be important for both developed and emerging economies where Government and Health agencies are focusing on mobile phone based delivery of health information and care. 2) This paper focuses only on consumer engagement activities with eHealth information through mobile devices. Future research should include comparisons with PC Internet access, as well as engagement with eHealth Apps. The AMPLI study [15] shows that 23% of respondents have downloaded health and wellbeing applications (Apps) in 2012. For Smartphones users, therefore, the activity of choice for eHealth may well be through downloading Apps to better manage their health.

In concluding, it is recognised that mobile devices have a potential advantage to bridge the digital divide [23] and can revolutionise health systems in emerging economies [24]. In conclusion, individuals' engagement activities with eHealth offerings through mobile devices remains an important area of future research [20] to get a larger picture of individuals' behaviour towards interacting with Web 2.0 health service offerings. Thus, an understanding individuals' range of engagement activities through mobile devices is important to determine the extent to which eHealth social media is being used to better inform Governments and healthcare agencies.

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